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Communication, forensic science, and the law

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Abstract

The communication of forensic science within the criminal justice process has been highlighted as an issue in a series of high profile reports dating back more than a decade. A forensic scientist has to be able to effectively communicate complex scientific ideas across multidisciplinary borders including the police, lawyers, and jurors, while concurrently being restrained by processes and procedures which exist within the criminal justice process. Communication research has begun to be undertaken to try and clarify and identify what causes some of the problems in communicating forensic science, to suggest how these might be addressed and to assess the efficacy of new approaches.

This article is categorized under:
Jurisprudence and Regulatory Oversight > Communication Across Science and Law
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KEYWORDS

forensic science, forensic scientist, law, science communication, science communication jury

1 | INTRODUCTION

In 2009, a report from the National Academy of Science (NAS) report *Strengthening Forensic Science in the United States*, found that wide variations existed between different forensic disciplines and the language and methods that they used to report their findings. As a result, their second recommendation argued for "standard terminology to be used in reporting on and testifying about the results of forensic science investigations" (National Research Council, 2009). This was reiterated in the PCAST report of 2016 (President's Council of Advisors on Science Technology, 2016), more recently forensic science communication was raised as being problematic in the House of Lords Select Committee Report (Science Technology Committee, 2019). Despite being highlighted as an area of concern for over a decade, the efficacy of communication for forensic science continues to be an issue within the criminal justice systems and CS is an issue that transcends borders. The use of, and increased reliance on, scientific evidence within criminal investigations was noted by The Right Honorable, The Lord Thomas of Cwngiedd who said "The vast majority of serious cases, and a significant proportion of all Crown Court cases, now include presentation of one or more types of forensic evidence" (2014). This increased tendency to turn to forensic science to aid investigations has continued, to the extent that it is now an expected part of any investigation, and forensic science evidence is found across the spectrum of crimes that the police investigate (Peterson, 2015). While scientific evidence may play an important role in the investigation and

the prosecution of criminal offenses it may also conversely hinder the investigation and be detrimental to the process of the case in court if not communicated well. It has been demonstrated that poor communication can, and has, contributed to miscarriages of justice (Eades, 2003; Garrett & Neufeld, 2009; Langdon & Wilson, 2005) with an associated loss of trust in scientific evidence and a reduction of its perceived efficacy.

A criminal investigation and the subsequent presentation of the case in court results in people coming together from widely disparate groups, bringing with them different educational backgrounds and understanding of science. Forensic scientists, police, lawyers come together with members of the public as finders of fact in the courtroom. This means that communications that occur during the investigation are often cross-disciplinary and have to traverse barriers, both cultural and social. In summary, communication is generally understood to be a process of sharing information and instruction. The transfer of information is not a simple linear process, however, and how, and to what degree, information being communicated is understood, can be influenced by potential barriers and filters (Bucchi, 2008; Dance, 1970). Effective communication is therefore reliant on both how the message is communicated but also on those who receive that communication, the ability of the communicator to convey the information to be communicated, and the context of the message being communicated (Bucchi, 2008; Howes, 2015). Understanding of the message that is communicated can and often is, influenced by factors including, but not limited to, expectations of the audience, characteristics of the sender of the message and cultural differences between parties, essentially effective communication cannot be removed from the context within which the communication occurs (Bucchi, 2008; Eades, 2003). Research into the efficacy of communication and communication methods has been undertaken to begin to understand the implications of these types of communication on the understanding that nonscientists have about the evidence before them. This paper will discuss where problems may lie in the communication of forensic science, including medical science, and some of the ways research is being used to understand these communications and address the issues which have been identified.

2 | FORENSIC SCIENCE COMMUNICATION

Unlike many scientists, who primarily write for, and communicate with, other scientists who are working within the same field (Bucchi, 2008), the most common audience for forensic scientist's communications are nonscientists. For the forensic scientist, their main audiences include other professional members of the criminal justice system such as police or lawyers, and members of the public (Cole, 2013). The jury who hears their evidence and are the finders of fact within the courtroom are all members of the public for whom this might be the first experience of hearing forensic evidence. The forensic scientist is therefore always communicating with what could be considered a lay audience who do not share their knowledge, but who importantly do not share the same understanding of their specialist scientific language (Bucchi, 2008; Halliday, 1993; Rice & Giles, 2017). How the forensic scientist communicates is also influenced by processes introduced by working within the criminal justice system, such as the formalized methods of communicating that exist within a courtroom, and the remote way in which forensic scientists provide reports for the police and courts which results in limited personal interactions (Howes & Kemp, 2017). All of these have the effect of constraining the potential for dynamic back and forth discussions whereby a deeper understanding of the message can be built and developed.

Forensic science and forensic science evidence communications are complicated by the fact that forensic science is not a single, unified scientific discipline but is an umbrella term for a series of disciplines, many of which are quite disparate, relying on differing methodologies, techniques, and with different reliabilities (National Research Council, 2009). Some of these sciences are common such as medical, DNA or fingerprint evidence, but some are niche and rarely utilized. Even those that are commonly utilized, can be based on complicated scientific principles. This means that while police, legal practitioners, or the public may come across some types of evidence regularly or feel that they have gained an understanding of that evidence type, they may not have the same understanding across the full spectra of potential sciences. Indeed, scientific evidence in the court is considered expert evidence and therefore the scientist is an expert witness. As expert witnesses, forensic scientists can give opinion evidence in court on a subject on which they have knowledge and expertise above that of the layperson, in this case, the court since the lay audience in the court is not expected to have the same level of knowledge as they do (Ward, 2015). The forensic scientist, therefore, plays an important role in communicating their methods and findings to the finders of fact, the jury, allowing them to understand the evidence that is placed before them, enabling them to come to a decision. The jury is made up of members of the public who can come from a wide range of educational, social and cultural backgrounds and be from any age group and may have varying degrees of understanding of the scientific evidence that is placed before them. Given

this requirement to present evidence that is outside the expertise of their audience, the forensic scientist must be understandable to all, yet ensure that they do not dilute or otherwise influence the accuracy of the information that they are communicating (Howes & Kemp, 2017).

Forensic science as a discipline of disciplines includes laboratory-based sciences such as DNA analysis, toxicology and drug analysis as well as feature matching disciplines such as fingerprint comparison, tool marks, footwear comparisons, and so on. New disciplines and methodologies are also constantly being developed as has been seen by the recent surge in digital evidence analysis. In these cases, the challenge for the scientist is to be able to communicate the outcomes of their scientific analysis accurately and succinctly to a nonscientific audience which has varying expectations of science. For many, science can be understood to convey an absolute truth discovered through the application of scientific methodology and experiment (Golan, 1999). This cultural understanding of science is found not only within members of the investigation, but also by the judiciary and members of the jury who are situated within the courtroom (Golan, 1999; Mnookin, 2007). The fact that most scientific evidence used within the criminal justice system is unable to provide an unequivocal answer to the question posed, causes complications for the forensic scientist when attempting to communicate the uncertainty that is inherent in their analyses leading to frustrations within the court (Redmayne, 1996). Also coloring the understanding of a jury, and perhaps the other nonscientists involved in a case is what has become known as the *CSI Effect*, which refers to the influence of fictional depictions of forensic science and the role that it plays within any investigation. Concerns have been raised about the extent to which this influences consumers of forensic science, who may form an idealized idea of the role of scientific evidence in the prosecution of criminal cases (Cole & Dioso-Villa, 2008; Schweitzer & Saks, 2007; Shelton, 2010; Shelton, Kim, & Barak, 2006).

2.1 | Communicating across boundaries

Forensic scientific evidence is utilized in two distinct phases within any investigation, first, it is a tool which can, and is used by an investigative team, often to signpost the next stages that they need to explore or consider for their investigation. Second, forensic scientific evidence can also be presented in court during the trial process. As a contributor to an investigation and the court case, the forensic scientist presents their evidence, evaluation, and opinion in one of two ways, most commonly through written reports, but also verbally when presenting evidence in court. When examining the communication of science to the public, Bucchi (2008) identified three models of communication that can be applied; deficit, dialogue, and participation and Howes and Kemp (2017) argue, with justification, that these models also apply to the communication of forensic science within the criminal justice process. They contend that while dialogue and participatory models of communication occur, especially during the investigative phase, the deficit model most accurately describes the role of the forensic scientist and the way that they communicate with other actors within the criminal justice process. The deficit model views the expert, in this case, the forensic scientist, as a source of knowledge that they in turn pass to others, this typifies how information is passed on by the forensic scientist, both in the form of written reports and through evidence given in adversarial court systems, where the jury are passive recipients of information that is controlled and guided by the formalized court processes. The more dynamic dialogue and participatory models of communication occur during the investigative process where police and, on occasion, legal teams, can come together with the forensic scientist to elucidate and enhance meaning and understanding (Howes & Kemp, 2017).

Much of forensic science communication relies on a written statement or report produced by the forensic scientist after they have concluded their evaluations. This is then passed to the police, and then to the legal team and maybe the only communication that occurs between these groups. As already mentioned, there is a lack of consistency in forensic report writing, due to various factors, not least of which is that there is not one single type of forensic science, but a myriad, all of which use different terminologies, language, and methodologies. Even within each scientific discipline, differences in terminology and approach to the presentation of information have been identified. These difference have been highlighted by the reports which came out of the US (National Research Council, 2009; President's Council of Advisors on Science Technology, 2016). Since the issue was raised, efforts have been made to standardize the language utilized by scientists, usually through the implementation of guidance (Champod, Biedermann, Vuille, Willis, & Kinder, 2016; Standards Australia, 2013) and recommendations to improve readability for the nonscientist (Howes, Kirkbride, Kelty, Julian, & Kemp, 2013). Whether these guides have been effective is still open to debate and research (Howes, 2015a; Howes et al., 2013; Martire, Kemp, Watkins, Sayle, & Newell, 2013). Much of this has concentrated not

only on the content of the report and its readability, but also the conclusions that the scientist draws within their reports and the language that they use, which often obfuscates the meaning for the lay reader.

What has become clear is that writing a report as if it is for other scientists who have the same background understanding of the subject, results in a forensic report which is not completely understandable by nonscientists, especially when it comes to communicating the science upon which the conclusion is based (Howes, 2017; Howes et al., 2013). In her work examining the relationship between the information within the expert's report and the information that police can glean from that report, Howes (2017) found that the police who were initial consumers of the forensic report stated that many reports were not accessible to them, due to the degree of the scientific language used. As a result, some would contact the forensic scientist directly to try and gain an understanding of meaning, setting up a dialogue in which they were able to elucidate further meaning especially in terms of the weight of the evidence, rather than the science of how the results were achieved.

It is of interest that Howes (2017) also found that police expressed concerns that the scientific language in which reports and scientific evidence were presented would also be an issue for a juror and others who might have to extract meaning from the reports and who do not have the opportunity to question the scientist. They acknowledged that they were often able to contact the forensic scientist to get further explanations about the reports that they saw, but legal representatives are usually more removed from the forensic scientist, dependent on jurisdiction, and therefore they and the jury members would not have the same opportunities that the investigators have, to ensure full understanding of the implications of the evidence evaluation. Legal personnel within the courtroom are part of the communication process for forensic science since they direct and control the communication by the forensic scientist through their questions. This formalized approach to communication limits the chances that jurors have to gain further understanding of the information being presented but also relies on the ability of the legal team to understand that evidence and allow the forensic scientist the chance to explain their findings. Legal practitioners can also find understanding reports difficult (Cashman & Henning, 2012), this, in turn, results in them not asking the questions of the forensic scientist in court which would allow them to explain and expand on their written reports, thereby ensuring that full understanding is conveyed. Despite evidence that the opportunity to develop a dialogue with the forensic scientist to elicit a full understanding of reports, is a positive one, it is clear that time constraints mean that this rarely happens in most jurisdictions (Howes, 2015b). Interestingly, Horan and Maine (2014) add another dimension to the issue of comprehension by juries by arguing for an increase in the use of technology, especially visual aids such as 3D reconstructions of the crime scene, to assist with jurors comprehension and retention of oral testimony. The intervening years have seen an increase in the use of communication supports such as Computed Tomography (CT) scans and 3D models, but use is often limited by both access to technology within the court and a lack of understanding of the possible biasing impacts that these might have on the jury.

In major cases, expanded learning and understanding which elucidates meaning for the consumer of the report can come about during periodical case conferences which bring together all the investigation team members, allowing scientists and other specialists to answer questions and expand on their findings, even before the production of a final report (Bucchi, 2008; Howes & Kemp, 2017). How often these case meetings occur and who attends them differs between jurisdictions and countries. These case conferences can facilitate the investigative team to come together with the scientist which allows them to understand and further contextualize their work and assist with contributing to planning or prioritizing avenues of scientific investigation. This participatory approach to communication has been criticized by some commentators due to the potential for bias that it introduces (Ditrich, 2015; Dror, Kukucka, Kassin, & Zapf, 2018; Edmond et al., 2017). Indeed it is argued that the evaluation of forensic evidence should be undertaken separately from the investigation, with practitioners blinded to pertinent information, to guard against the potential for bias (Cooper & Meterko, 2019). This was echoed in the 2009 NAS report for example, which argued strongly for a separation between police and scientists to ensure that there was no undue influence felt by scientists while undertaking their work (National Research Council, 2009).

2.2 | Identified barriers to communication

Barriers to effective communication between forensic scientists and those to whom they are communicating their science have been identified. The use of technical terminology has been repeatedly mentioned as a barrier to effective communication of scientific ideas to those without specialist knowledge, but Halliday (1993) argue that a further complicating factor is caused not simply through the use of technical language but the more general way in which scientists communicate, which result in dense texts where terminology and their underlying concepts interweave in a way that is only understandable by

another scientist in the same field. This results in a mismatch between the message being conveyed by the scientists and comprehension on the part of those receiving the message. Indeed Peters (2008) argues that it is not possible to translate science directly into lay language as a result of the differences that exist between scientific language and lay-language. He goes on to contend that while the scientist can communicate effectively their opinion or the advice that they have formed based on their scientific evaluation, it is not possible to thoroughly, and accurately, convey the scientific reasoning or underpinning for that opinion. This is further confounded by misunderstandings that might occur through the presumed knowledge of the individual(s) on the receiving end of the communication. Here a person's life experiences can interfere with understanding. Members of the jury, or the legal team, might feel that they already have knowledge of the subject area gained through life experiences (Shelton et al., 2006). The expectations associated with, and developed through this knowledge might hamper or support an understanding of the information being put before them (Peters, 2008). Within an investigation and the subsequent court case, it is not only the conclusion that the scientist draws that is important, but the process that was undertaken to lead to that conclusion, therefore it is important for the forensic scientist to communicate all steps in their work clearly, accurately, and understandably (Howes & Kemp, 2017).

The conclusions that can be drawn from the analysis of forensic evidence may not point absolutely to a single answer since the evaluation of evidence recovered from a crime scene, forms part of the attempt to recreate what might have happened, that is it tries to retrospectively explain the observations made (Cole, 2013), Berger (2010) argues that forensic science is, therefore, a science of "reasoning backwards." This means that normal, deductive reasoning that allows the creation of firm conclusions is rarely possible. In reality, the reasoning is inductive, meaning that there are possible actions that could have caused the observations made by the forensic scientist, but these are never certainties. Indeed, this probably underpins much of the confusion in communication that occurs, since the scientist can only suggest the strength of support for potential hypotheses which are put forward as a possible cause for their observations rather than presenting it as a proven fact (McQuiston-Surrett & Saks, 2007; Saks & Koehler, 2008). Communication of the strength of support for these hypotheses can be undertaken in different ways and have been the object of much discussion which have demonstrated that this lack of certainty, or more accurately put, the uncertainty that surrounds conclusions in forensic science are probably the most difficult part of any communication for the forensic scientist to convey, ensuring that they are understood clearly while maintaining the validity of the evaluation and the science that has been undertaken (de Keijser & Elffers, 2012; Martire, 2018; Martire et al., 2013; Martire, Kemp, Sayle, & Newell, 2014; McQuiston-Surrett & Saks, 2007, 2009). Issues in the way in which uncertainty is communicated and how this can be misunderstood by others in the criminal justice system and by the jury as the triers of fact form a major part of the research into communication of forensic science as misunderstandings can and have had negative impacts on court proceedings (Howes et al., 2013; Martire, 2018; Martire et al., 2013; Martire et al., 2014; McQuiston-Surrett & Saks, 2007, 2009; Saks & Koehler, 2008). Debates continue about the accessibility of the different ways of communicating uncertainty and have resulted in a great deal of scrutiny of language that is used. What has become clear is that each method of communication is fraught with issues based on the interpretation that is placed on these communications by those that are listening to them, which emphasizes the need to forensic practitioners to not use phrases such as "weak support" that have a specific meaning for them, without ensuring that they clarify and explain the implications for that specific set of circumstances since misinterpretation can lead to miscarriages of justice(Martire et al., 2014; Saks & Koehler, 2008).

This need to communicate what can be complex scientific principles that allow the reader to understand the meaning behind the conclusions being presented to them highlights barriers to communication that have been identified concerning the issue of communicating science (Roberts, 2015). The level of scientific literacy on the part of those who are on the receiving end of the information from forensic scientists has been noted as an issue for jurors, and other professionals within the court (Howes & Kemp, 2017). This is often based on educational background. Science is often not taught to a high level in schools and therefore there is often a lack of scientific knowledge, on the part of nonscientists. Neither science nor statistics are routinely taught in law school, and police officers usually also have limited scientific or statistical education, in common with most members of the general public. A study by Hans (2007) showed that the general background scientific education of judges and juries was similar, albeit low, with judges averaging 10.29 courses across high school and college, and jurors 9.72 courses. This means that the scientist is generally communicating these complex ideas to a nonspecialist audience. Statistics are inextricably entwined with the communication of science. Statistical analysis allows the scientist to evaluate their evidence and assign probabilities to their conclusions as a way of communicating uncertainty (Donnelly, 2007; Kaye & Koehler, 1991). This adds another layer of confusion and complexity onto how they convey their opinion, most people do not work with this type of reasoning or language and yet, juries and indeed, other professional groups within the criminal justice system are expected to understand the arguments and information provided and apply it to the problem placed in front of them (Donnelly, 2007). The numbers

may be large and the statistical analysis complex, meaning that the significance can be difficult to put into context even for those that are more numerate (Martire et al., 2014). On occasion, to try and overcome this, statisticians have been brought into court to try and explain the statistics and their meaning to the jury, demonstrating how the scientist came to the conclusion that they did and what the statistical weight placed on the evidence might mean (Donnelly, 2007). Other work is ongoing to try and overcome this potential communication gap, through the use of technology in court (Horan & Maine, 2014) and through aids that are available to the jury or judges to give them a quick guide to the science (Royal Society, 2017).

BOX 1 FORENSIC SCIENTIST IN COURT

The expert witness is historically introduced to the court to provide information on a subject, which is out with the expertise of a layperson and is the only group of witnesses who can present an opinion to court. Forensic science is expert evidence in court and therefore a forensic scientist when acting as an expert witness is able to draw conclusions from their work and present them as opinions. Their opinions are formed after evaluating the evidence, often involving complex testing.

3 | CONCLUSION

In conclusion, issues in forensic science communication have come under greater scrutiny as evidence has unfolded that demonstrates the role that miscommunication of forensic science can play in miscarriages of justice. This has also been brought to greater prominence by reports published over the last decade, each of which highlights the same problems. The forensic science community has begun to examine what the issues might be and research has started to identify just how problematic the issue is, understanding how processes dictated by the criminal justice process impacts on the ability of the forensic scientist to communicate effectively. Forensic scientists are not only constrained by the requirements imposed by working within the criminal justice system, but are also challenged by the need to communicate across disciplinary boundaries, as well as with the public.

Recent work has used communication research to start to unpick the challenges that might hinder accurate communication and gradually suggestions are beginning to emerge for ways to adapt communication strategies to ensure greater efficacy, the first step being to develop a robust understanding of the issues which exist, however, the development of strategies such as streamlining the use of language is further hampered by the complexity of the forensic science landscape and the differences that exist between it, as an applied set of sciences, and more traditional science that exists in research laboratories. There is still a long way to go in fully unpicking and understanding exactly how each of the challenges can be met to ensure that forensic science is communicated well and accurately at all stages of the criminal justice process, however, this communication is of vital importance to ensuring that justice is based on sound scientific communications.

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CONFLICT OF INTERST

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